

Appl. No. 10/524,788
Amdt. dated Feb. 20, 2007
Reply to Office action of Oct. 17, 2006

AMENDMENTS TO THE DRAWINGS:

The attached sheet of drawings includes changes to the figure and replaces both the original and replacement sheets. The figure of drawings has been amended to more clearly show the reference characters and character lead lines.

Attachment: Replacement Sheet

REMARKS

Claim 5 is presently in the application. Claims 1-4 and 6-10 have been canceled.

The drawing has been objected to for failing to clearly show the characters and lead lines. The figure has been amended to more clearly show the reference characters and character lead lines. In view of the above, withdrawal of the objection to the drawings is requested.

Claims 5-10 have been rejected under 35 U.S.C. 102(b) as anticipated by Suzuki et al (JP 11-121820). Reconsideration of the rejection is respectfully requested.

Independent claim 5 has been amended to incorporate the language of claims 6-8.

Independent claim 5 is directed to a piezoelectric actuator, comprising a multilayer construction of piezoelectric layers (2) and inner electrodes (3, 4), which are located in a piezoelectrically active region (A) between the layers and can be acted upon by an electrical voltage, and at least one inactive region (B, C) without inner electrodes in the layer construction of the piezoelectric actuator (1), the at least one inactive region (B, C) without inner electrodes is formed of a material whose mechanical and thermal properties match the mechanical and thermal properties of the active region (A), including the combination and interaction of the material comprising the piezoelectric layers (2) and the inner electrodes (3, 4), the improvement wherein the matching mechanical and thermal properties of the piezoelectric layers (2) of the inactive region (B, C) and of the active region (A), include **shrinkage** upon sintering of the multilayer construction of piezoelectric actuator (1), **thermal expansion**, and **elasticity**.

Suzuki et al teaches a laminated piezoelectric actuator 1 comprising a piezoelectric ceramic 2 laminated and sintered with an internal electrode 3 composed of silver palladium alloy material. Suzuki et al is concerned with the problem of separation between the piezoelectric layers and the internal electrodes, what Suzuki refers to as “interfacial peeling.” See, para. [0005]. To reduce this effect, Suzuki suggests that the shrinkage rate of the internal electrodes more closely match the shrinkage rate of the piezoelectric layers. This is achieved by providing an internal electrode composed of 50-70% by weight of silver, 30-50% by weight of palladium doped with the ceramic material of the piezoelectric layers in a range of 2-12% by weight.

On page 3 of the Office action, the examiner finds that Suzuki teaches inactive regions and active regions made from the identical ceramic basic substance with additional dopants silver (palladium) inserted into the inactive regions. No such teaching can be found in Suzuki et al. The examiner is requested to identify where this teaching can be found in the reference.

Suzuki does refer to shrinkage matching between the internal electrodes and the piezoelectric layers in the active regions, but there is no teaching or suggestion of thermal expansion matching or elasticity matching between the inactive and active regions as required by claim 5. Further, there is no evidence of record that thermal expansion matching and elasticity matching naturally result from shrinkage matching. In other words, even if Suzuki teaches shrinkage matching between the internal electrodes and the piezoelectric layers in the active regions, or even shrinkage matching between inactive regions and active regions, it does not necessarily follow that the properties of thermal expansion and elasticity are also matched.

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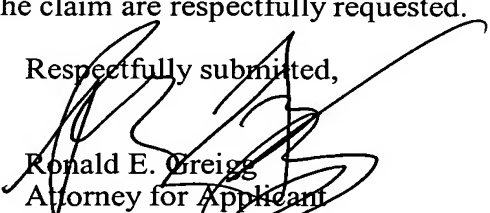
To support a rejection of a claim under 35 U.S.C. 102(b), it must be shown that each element of the claim is found, either expressly described or under principles of inherency, in a single prior art reference. See Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984). The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

Suzuki et al does not teach a piezoelectric actuator of the type recited in claim 5 in which the matching mechanical and thermal properties of the piezoelectric layers of the inactive region and of the active region, include **shrinkage** upon sintering of the multilayer construction of piezoelectric actuator, **thermal expansion**, and **elasticity**. Accordingly, claim 5 is not anticipated by Suzuki et al.

Please charge the fee for any necessary extension of time to deposit account No. 07-2100.

Entry of the amendment and allowance of the claim are respectfully requested.

Respectfully submitted,


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